



Fundamentals of Fuel - Gasoline

Defined – Gasoline is a blend of light hydrocarbon fractions of relatively high anti-knock value. A high-quality gasoline has the following properties: (1) proper volatility to ensure easy starting and rapid warm-up; (2) clean-burning characteristics to prevent harmful engine deposits; (3) additives to prevent rust, oxidation, and carburetor icing; (4) and a sufficiently high octane number to prevent engine knock.

How is gasoline blended?

Gasoline is seasonally blended to perform well in current vehicle conditions. This includes easy-starting, smooth operation under cold and warm conditions, and good acceleration performance. Different properties affect or can predict this performance including volatility, octane and proper use of additives.

The Reid Vapor Pressure (RVP) test is used to measure the volatility (tendency of a substance to vaporize) of gasoline. Since gasoline engines operate by igniting a mixture of air and gasoline vapors, the tendency to vaporize (or its volatility) is important. Gasoline is seasonally blended, so the RVP is different for each:

- ✓ Summer – Lower RVP (Less than 9 psi); prevents vapor lock & has less evaporative emissions
- ✓ Winter – Higher RVP (15 psi); allows for cold starts and engines burn vapors, not liquids

What are some general fuel storage guidelines?

Gasoline should not be stored longer than a few weeks because:

1. It will evaporate during storage, changing fuel characteristics
2. It may be used in the wrong season
3. Oxidative properties deteriorate

Gasoline Octane:

Historically, gasoline has been classified by the octane number, which indicates the antiknock quality of the fuel. The higher the octane number, the better the knock resistance resulting in less engine wear. Octane can only be determined by running the fuel in a special engine and comparing it to fuels of known octane. Two procedures are commonly used in the same engine, giving different results: the *Research* method and the *Motor* method. Results are then averaged for “pump” octane, which must be posted for the consumer.

Typical Octane Levels:

- ✓ Regular Unleaded – 87
- ✓ Mid-Grade Unleaded – 89
- ✓ Premium Unleaded - 92

Where does ethanol come into play?

Ethanol = Ethyl Alcohol = Grain Alcohol. Ethanol improves octane and emissions resulting in cleaner burning and typically is added at 10% (except for RFG & E-85). RFG = Reformulated Gasoline / E-85 = 85% ethanol and 15% gasoline

E-85 is an alternative fuel as defined by the U.S. Department of Energy. It burns cleaner than gasoline, is completely renewable, domestic, and is an environmentally friendly fuel.

However, it is important to note that an important property of ethanol is solubility in water. Gasoline, on the other hand, is not water soluble so if water gets into a gasoline tank, a layer will form on the tank bottom not affecting the gasoline. If water gets into a tank containing a gasoline blended with ethanol, the ethanol will go into the water layer. This is referred to as phase separation. The bottom phase or layer will consist of ethanol and water, and the upper phase will consist of ethanol deficient gasoline. Pumping this into a vehicle tank could result in plugged filters and most often causes the vehicle to quit running within a very short period of time.

What about RFG?

Reformulated Gasoline (RFG) requirements apply to gasoline supplied to areas with severely high ozone levels (such as Chicago and Milwaukee). RFG was mandated to reduce emissions of ozone forming volatile organic compounds (VOCs) during the high ozone season. RFG must contain at least 2% oxygen, has a vapor pressure of 7.2 or 8.1 max, and benzene is reduced to 1% max.

Improve your gasoline storage with:

- ✓ FS Valve-Save – Significantly reduces engine deposits, reduces emissions, restores fuel economy, improves storage life and more...
- ✓ FS CLEAN-FLO – Gives your gasoline 3 times the current EPA minimum IVD (intake valve deposits) detergency and can add up to 6 months extra storage life.

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